Course Syllabus

Course Code and Name	**EE 26221 –Introduction to Engineering Design**
Credit and contact hours	**2 (2, 0, 0) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (3) / Year (2)**
Course Prerequisite	**-**
Textbook	Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, "Exploring Engineering - An Introduction to Engineering and Design", Academic Press, 5th Ed., 2021.
Course Description	This course covers the following topics: Introduction to engineering disciplines and careers, Role of the engineer in society. Introduction to Engineering Design. Engineering as a Profession. This course aims to introducing the systematic engineering thinking, communication and teamwork dynamics in a design process, academic success skills such as time management, study techniques, working in teams, and study groups. Engineering approach to problem solving. Engineering design Steps – Defining the Problem – Generation of Alternative Concepts – Evaluation of Alternatives and Selection of a Concept – Design Defense – Modeling – Testing – Performance evaluation – Design Report.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**CE 26221 – Engineering Mechanics**
Credit and contact hours	**3 (2, 2, 0) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (3) / Year (2)**
Course Prerequisite	**-**
Textbook	R.C. Hibbler, Engineering Mechanics: Statics and Dynamics, Pearson, latest edition
Course Description	This course gives the Engineering students the basic requirements of Engineering Mechanics that must be taught to all Engineering students. The course consists mainly of the two parts of Engineering Mechanics: statics and dynamics. The course is limited to planar static and dynamic systems.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**ME 26221 – Engineering Drawing**
Credit and contact hours	**3 (1, 0, 2) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (4) / Year (2)**
Course Prerequisite	**-**
Textbook	Simmons, C. and Maguire, D. "Manual of Engineering Drawing", 2nd ed., British and International Standards, last edition.
Course Description	This course teaches the basics of engineering drawing utilizing free hand sketching, and mechanical drawing. The fundamental principles of orthographic projection as well as the topics of dimensioning, sectional views, isometric and perspective pictorials views.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**ME 26222 –Production Technology and Workshops**
Credit and contact hours	**2 (1, 0, 2) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (4) / Year (2)**
Course Prerequisite	**-**
Textbook	John A. Schey, "Introduction to Manufacturing Processes", (McGraw-Hill Series in Mechanical Engineering & Materials Science), last edition.
Course Description	This course gives introduction, industrial safety, function, and planning of workshop. Properties of materials and their applications. Workshop metrology. Basic bench work operations. Machining operations, tools, equipment, and machinery used in basic workshop processes: Turning, Milling, Grinding, Drilling, Shaping, Forging, and Sheet metalwork. Welding Processes: Gas welding, Arc welding, Brazing and Soldering. Casting processes: Sand casting, Die-casting. The course contents will be periodically reviewed by the instructors and the Undergraduate Committee to include new materials of relevance and improved teaching method.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26222 – Electric Circuits-1**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (4) / Year (2)**
Course Prerequisite	**PHYS26211 Advanced Physics**
Textbook	J. Nilsson and S. Riedel, Electric Circuits, Prentice Hall, 2018.
Course Description	This course covers the following topics: Basic concepts and circuit elements -Ohm's law -Kirchhoff's laws (KCL and KVL) -Resistors in series and parallel, voltage and current divisions -Node voltage analysis -Mesh current analysis- Thevenin and Norton equivalent -Maximum power transfer – source transformation – superposition -Capacitors and inductors- Complex numbers -Sinusoids and phasors -Steady state AC circuit analysis -AC power analysis and PF correction.
Course is prerequisite for	• EE26323 Electric Circuits (2) • EE26341 Signal Analysis and Systems • EE26333 Analog and Digital Electronic Circuits

Course Syllabus

Course Code and Name	**EE 26231 – Fundamental of Electronic Devices**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (4) / Year (2)**
Course Prerequisite	**PHYS26211 Advanced Physics**
Textbook	Thomas L. Floyd Electronic Devices Conventional Current Version Tenth Edition 2018
Course Description	This course covers Semiconductor materials intrinsic – n and p types. Charge dynamics in semiconductors – drift and diffusion current. Ideal diodes – current and voltage characteristics. Terminal characteristic of junction diodes. Techniques of diode circuit analysis. The small signal model of the diodes-Zener diodes. Application of diodes in typical circuits – Rectifiers, regulated power supplies, logic gates, limiting circuits etc. Physical structure, NPN and PNP transistors. Graphical representation of BJT characteristics. Analysis of BJT circuits at DC: modes of operation, transistor as a switch, biasing the BJT. Transistor as an amplifier: graphical analysis, small signal equivalent circuit models, and analysis of basic BJT amplifier configurations. Current and Voltage characteristics of different types of FETs. Regions of operation. Analysis of FET circuits at DC, biasing the FET, FET as an amplifier.
Course is prerequisite for	• EE26332 Logic Circuits Design • EE26333 Analog and Digital Electronic Circuits • EE26434 Electrical and Electronic Measurements • EE26452 Power Electronics

Course Syllabus

Course Code and Name	**EE 26332 – Logic Circuits Design**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (5) / Year (3)**
Course Prerequisite	**EE 26231 Fundamental of Electronic Devices**
Textbook	M. Mano and M. Ciletti, Digital Logic Design, Addison Wesley Longman, 2006.
Course Description	This course cover the following topics: Number systems, Logic gates, truth tables, Boolean functions and Boolean algebra - Canonical forms, SOP and POS forms, NAND/NOR circuits - K-maps - Design and analysis of combinational logic circuits such as comparators, code converters, adders, etc - Multiplexers, demultiplexers, encoders and decoders - Programmable logic devices (PLAs, ROMs, PALs) - Introduction to synchronous sequential circuits, latches, flip-flops, and timing - Sequential logic circuit analysis and design, state diagrams, registers, and counters - Modeling, simulation and synthesis of digital circuits from HDL models.
Course is prerequisite for	• EE26434 Electrical and Electronic Measurements • EE26435 Introduction to Microprocessor • EE26444 Computer Networks

Course Syllabus

Course Code and Name	**EE 26324 – Computer Programming**
Credit and contact hours	**3 (1, 2, 2) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (5) / Year (3)**
Course Prerequisite	**MATH26213 Differentiation and Integration – 2**
Textbook	Stephen J. Chapman, "MATLAB Programming with Applications for Engineers", 1st Ed., Cengage Learning, 2013.
Course Description	This course covers the following topics: Fundamental concepts of programming using structured programming language, specially "MATLAB" – Introduction to MATLAB – Basic programming tools – variables, data types, operators and operands – Problem Solving With MATLAB – Matrices in MATLAB – Basic operations on one/two dimensional arrays – function definitions – MATLAB Programming Loop Statements and Vectorizing Code – Plotting Techniques with MATLAB – two and three dimensions plots – Applications in Numerical Analysis conditional and iterations structures.
Course is prerequisite for	• EE26555 Computer applications in Power Systems

Course Syllabus

Course Code and Name	**EE 26323 –Electric Circuits -2**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (5) / Year (3)**
Course Prerequisite	**EE 26222 Electric Circuits-1**
Textbook	J. Nilsson and S. Riedel, Electric Circuits, Prentice Hall, 2010.
Course Description	This course covers the following topics: Three phase circuits - Magnetically-coupled circuits – Transformer- Computer-aided circuit analysis – Frequency Response - Resonant circuits: series and parallel resonance - Circuit analysis in the S-domain (i.e., using Laplace transform) - Fourier series and its application to electric circuits - Two-port networks.
Course is prerequisite for	• EE26361 Electrical Machines – 1 • EE26451 Electrical Power Systems – 1

Course Syllabus

Course Code and Name	**EE 26341 – Signal Analysis and Systems**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (5) / Year (3)**
Course Prerequisite	**EE 26222 Electric Circuits-1**
Textbook	C. Phillips, J. Parr and E. Riskin, Signals, Systems, and Transforms, Prentice Hall, (Last edition)
Course Description	This course covers the following topics: Classification of signals (continuous-time vs. discrete-time, periodic vs. non-periodic, energy signal vs. power signal, odd vs. even) - mathematical operations on signals. Classification systems - Properties of continuous-time LTI systems - convolution (convolution sum and convolution integral) - frequency domain analysis (Fourier series or Fourier transform) Properties of Fourier series or Fourier transform - sampling theorem - Nyquist rate Signal Processing using computer (Matlab and other software) - Introduction to digital signal processing DSP.
Course is prerequisite for	• EE26426 Automatic Control Systems • EE26443 Analog Communications • EE26546 Digital Signal Processing

Course Syllabus

Course Code and Name	**EE 26325 – Electromagnetic Fields -1**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (5) / Year (3)**
Course Prerequisite	**MATH26213 Differentiation and Integration – 2**
Textbook	W. Hayt and J. Buck, Engineering Electromagnetics, McGraw-Hill, 2011.
Course Description	This course covers the following topics: Vector analysis, Coordinate Systems-gradient, divergence, curl, and Laplacian of vector fields in different coordinate systems. Electrostatic fields: Coulomb's law and electric field intensity, electric flux density, Gauss's law and divergence, energy and potential, conductors, dielectrics and capacitance, Poisson, and Laplace equations. Steady magnetic fields: Magnetostatic fields: Biot-Savart's law, Ampere's law, curl and Stokes's theorem, magnetic flux density, magnetic forces, materials, and inductance – time varying fields – Maxwell equations. Wave Equation.
Course is prerequisite for	• EE26361 Electrical Machines – 1 • EE26342 Electromagnetic Fields – 2

Course Syllabus

Course Code and Name	**IE 26322 – Engineering Statistics and Probability**
Credit and contact hours	**3 (2, 2, 0) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (6) / Year (3)**
Course Prerequisite	**MATH26211 Differentiation and Integration – 1**
Textbook	Applied Statistics and Probability for Engineers by D. C. Montgomery and G. C. Runger, 5th Edition, John Wiley & Sons, Inc., 2019.
Course Description	This course is designed to enable students to analyze the concepts of the presentation and analysis of data, measures of central tendency, measures of dispersion, probability theory, discrete and continuous statistical distributions, sampling methods, testing hypotheses, goodness of fit tests, correlation coefficients, and regression analysis.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**IE 26323 –Engineering Economics**
Credit and contact hours	**2 (2, 0, 0) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (6) / Year (3)**
Course Prerequisite	**-**
Textbook	W. G. Sullivan, E. M. Wicks, and C. P. Koelling. Engineering Economy, New York, (16th Edition) 2014.
Course Description	Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26361 – Electrical Machines – 1**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (6) / Year (3)**
Course Prerequisite	**EE 26323 Electric Circuits -2** **EE 26325 Electromagnetic Fields -1**
Textbook	A. Fitzgerald, C. Kingsley and S. Umans, "Electric Machinery", 6th Ed., McGraw-Hill, 2003
Course Description	This course covers the following topics: Magnetic circuits transformers – Single phase power transformer – Theory of operation – Construction and types – Equivalent circuit – efficiency – voltage regulation – phasor diagram and experimental No load, Short Circuit, and load tests. Three phase transformer – Connection diagram – tap changing – Auto transformer, voltage and current transformers – Saudi Building Code requirements – DC Machines – Theory of operation – Construction and Types – Commutation in DC machines – Torque Speed and Torque Current Characteristics – Speed control of DC machine.
Course is prerequisite for	• EE26462 Electrical Machines – 2

Course Syllabus

Course Code and Name	**EE 26342 – Electromagnetic Fields – 2**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (6) / Year (3)**
Course Prerequisite	**EE 26325 Electromagnetic Fields -1**
Textbook	Sadiku, Matthew N. O. Elements of Electromagnetics. New York: Oxford University Press, 2001.
Course Description	This course cover the following topics: Review of Maxwell's equations and their history - Review of linear systems in time and frequency domains - Plane waves in multi regions (normal incidence) - Electric field polarization and pointing theorem and power flow - Plane waves in multi regions (oblique incidence) - Snell's laws of reflection and refraction - Transmission line theory: voltage and current equations - Lossy and lossless lines, attenuation and propagation - Input and characteristic impedances of the line - Smith chart and matching techniques. Parallel plate waveguide (TE & TM modes) - Rectangular waveguide (TE & TM modes) - Circular cylindrical waveguide (TE & TM modes) functions - Rectangular and circular cylindrical cavity resonators (TE & TM modes).
Course is prerequisite for	• EE26447 Antennas and Wave Propagations • EE26448 Optical fiber communications

Course Syllabus

Course Code and Name	**EE 26333 – Analog and Digital Electronic Circuits**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (6) / Year (3)**
Course Prerequisite	**EE 26222 Electric Circuits-1** **EE 26231 Fundamental of Electronic Devices**
Textbook	Sedra and K. Smith, Microelectronic Circuits, Oxford University Press, 2009.
Course Description	This course cover the following topics: Review of basic BJT amplifiers - Feedback Amplifiers - Multistage amplifiers - Operational Amplifiers (Op-Amps) - Analog building blocks using Op-Amps - Determination of type and order of the filter needed to meet the specifications - External characteristics of Op-Amps - Operation and design of linear analog circuits using Op-Amps - Nonlinear OP-AMP circuits - Digital-to-analog and analog-to-digital converters - Digital ICs - Digital Circuits
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26426 – Automatic Control Systems**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26341 Signal Analysis and Systems**
Textbook	Katsujiko Ogata, Modern Control Engineering, 5th Ed., Pearson Prentice Hall 2010
Course Description	This course covers the following topics: Mathematical Background - Mathematical Modeling of Physical Systems - Transfer Functions of Linear systems - Block Diagram Models - State Variables Models - Performance of Feedback Control Systems - Transient and Steady-State Response Analyses: First, Second and Higher-Order Systems- Stability of Linear Feedback Systems - Root Locus Techniques - Stability in the Frequency Domain - Design of PID controllers.
Course is prerequisite for	• EE26527 Industrial Control Systems

Course Syllabus

Course Code and Name	**EE 26434 – Electrical and Electronic Measurements**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26231 Fundamental of Electronic Devices** **EE 26332 Logic Circuits Design**
Textbook	David A. Bell, 'Electronic Instrumentation and measurements" 3rd edition, Prentice Hall. 2016.
Course Description	This course covers the following topics: Introduction - Measurement Fundamentals - Measurement units and standards - Measurement Errors and Statistical Analysis - DC indicating Meters, Electronic instruments – AC indicating Meters – Ohmmeter – Oscilloscope: Amplifiers, Attenuators, and differences. - Transducers, Sensors. - Spectrum analyzer. - Digital measurements (Digital voltmeter). - Liquid Crystal Displays (LCD) - Grounding shielding and noise.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26435 – Introduction to Microprocessor**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26332 Logic Circuits Design**
Textbook	B. Brey, The Intel Microprocessors, Prentice Hall, 2008.
Course Description	This course covers the following topics: Introduction to microprocessors and microcontrollers - Internal architecture of 8086 microprocessor -Assembly language of 8086 microprocessor - Hardware architecture of 8086 microprocessor - Main concepts of memory, interfacing, and I/O - Other microprocessors - Fundamentals of microcontrollers: architecture, I/O Ports, memory organization, addressing modes and instruction sets, simple programs.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26443 – Analog Communications**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26341 Signal Analysis and Systems**
Textbook	S. Haykin, Communication Systems, Wiley, 2009.
Course Description	This course cover the following topics: Overview and Basic elements of communication systems - Double Sideband Modulation (DSB), Amplitude modulation (AM) - Single Sideband Modulation (SSB), Vestigial Sideband Modulation (VSB) - Frequency Translation, Superheterodyne Receiver - Angle Modulation, Frequency Modulation (FM) - Frequency-division multiplexing (FDM) and Stereo FM Receiver - Correlation and Spectral Density - Random Variables - Random Process and Power Spectral Density - Random Processes and Linear Systems - Noise in Analog Systems - Sampling; Pulse Modulation (PAM, PWM, PPM) - TDM; Pulse Code Modulation (PCM); DPCM and DM; Regenerative Repeaters; Advantages of Digital Communication; Line Coding (Binary Signaling) – Introduction to Digital Modulation (ASK, FSK, PSK).
Course is prerequisite for	• EE26445 Digital Communications

Course Syllabus

Course Code and Name	**EE 26451 – Electrical Power Systems – 1**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26323 Electric Circuits -2**
Textbook	S. Haykin, Communication Systems, Wiley, 2009.
Course Description	This course covers the following topics: Overview on modern power system (Generation – Transmission – Distribution - Consumption) – Synchronous Machine and Transformer modeling in power system – Per Unit Calculation System – Series Impedance of Transmission Line – Capacitance of Transmission Line - Transmission Line modeling (Short, Medium and Long Transmission Line) – Transmission Line Parameters – Current and Voltage relations in TLs – Single Line Diagram – Impedance and Reactance Diagram - Short circuit conditions (symmetrical three phase S.C.) – Economic Operation and Optimal Generation Dispatch – Power Tariff System.
Course is prerequisite for	• EE26453 Renewable and Conventional Energy Conversion • EE26554 Electrical Power Systems – 2 • EE26555 Computer applications in Power Systems • EE26556 Electrical Power Systems Protection • EE26457 Smart Grids and Distribution System • EE26459 Power System Control • EE26458 High Voltage Engineering

Course Syllabus

Course Code and Name	**EE 26452 – Power Electronics**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (7) / Year (4)**
Course Prerequisite	**EE 26231 Fundamental of Electronic Devices**
Textbook	M. Rashid, "Power Electronics Handbooh", 4th Ed., Butterworth-Heinemann, 2017.
Course Description	This course covers the following topics: Power Electronic Devices – Power conversion - Diode rectifiers –Thyristors – Controlled rectifiers – DC-DC converters (Choppers) – Inverters – AC-AC Converters - AC voltage controllers - Cycloconverters – Gate circuits.
Course is prerequisite for	• EE26564 Electric Drive Systems

Course Syllabus

Course Code and Name	**EE 26444 – Computer Networks**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 262332 Logic Circuits Design**
Textbook	B. Forouzan, Data Communications and Networking, McGraw-Hill, 2007.
Course Description	This course cover the following topics: Introduction - Network models – Multiplexing - Transmission media – Switching - Error detection and correction - Local area networks - Wide area networks – Internetworking – Internetworking - Process to process delivery - Application layer - Network security - Network monitoring - Network Programming.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26445 – Digital Communications**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26443 Analog Communications**
Textbook	William Stanely and John Jeffords, "Electronic Communications; Principles and Systems", Thomsom Learning, Last Edition.
Course Description	This course covers the following topics: Functional blocks of analog communication systems, design of mixers, converters, RF and IF amplifiers, AM detectors, and FM discriminators. Video amplifiers, synchronize. Separators, horizontal and vertical oscillators and AFC. Functional blocks of color TV receivers. Color signal representation and processing. Functional blocks of digital communication systems: PAM, PWM, PPM and PCM. Design of S/H circuits, A/D and D/A converters, and timing (clock generator) circuits. Circuit design using PLL, VCO and multipliers. Design of PAM, PPM, PWM and PCM transmitters and detectors. Special circuits for phase shift keying.
Course is prerequisite for	• EE26549 Wireless Communications

Course Syllabus

Course Code and Name	**EE 26453 – Renewable and Conventional Energy Conversion**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	W. Cao, Renewable Energy: Utilization and System Integration, Published by ExLi4EvA 2016.
Course Description	This course cover the following topics: Introduction to energy systems and resources – Conventional Power Systems plants (Steam, Hydraulic, diesel, Nuclear, Gas and combined cycle power plants) - Solar Photovoltaic Systems – Modeling and Control – Grid integration of large- scale PV plants - Implementation of Photovoltaic Fault Diagnosis – energy storage - Wind Turbine Specification, large and small scale Design and Economic Evaluation - Design of a Low Cost Permanent Synchronous Machine for Isolated Wind Conversion Systems - Solutions and active measures for wind power integration - Properties and Control of a Doubly Fed Induction Machine - Power Converters for Renewable Energy - Distributed energy resources integration and demand response Modeling of Hybrid Renewable Energy System - Microgrid: Concept, Structure, and Operation Modes - DC distribution systems and microgrid.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26462 – Electrical Machines – 2**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26361 Electrical Machines – 1**
Textbook	Stephen Chapman, "Electric Machinery Fundamentals", 5th ed., McGraw-Hill Science, 2012.
Course Description	This course covers the following topics: Three-phase induction machines (construction, operation, equivalent circuit, performance calculations, starting of induction motors, speed control), small AC motors (single-phase induction motors, reluctance, and hysteresis motors. Synchronous machines (Theory of operation, Construction, and types) – Equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of AC generators), synchronous machine dynamics: the swing equation, steady state and transient stability. Universal motors, Servo motors, Stepper motors.
Course is prerequisite for	• EE26564 Electric Drive Systems

Course Syllabus

Course Code and Name	**EE 26471 – Graduation Project – 1**
Credit and contact hours	**1(2proj.)**
Required or Elective	**Required**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**114 CR**
Textbook	It is indicated according to the specialization field which will be chosen for the project.
Course Description	This course is the first part of a sequence of two courses that constitute the BSc graduation project. In this first part, each group must identify a problem domain, define the problem, identify, and specify the requirements, document the current system, analyze it, propose alternative systems, and design a solution. At the end of the course, each group must submit an oral presentation and written report.
Course is prerequisite for	• EE26572 Graduation Project – 2

Course Syllabus

Course Code and Name	**EE 26447 – Antennas and Wave Propagations**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26342 Electromagnetic Fields – 2**
Textbook	W. Stutzman and G. Thiele, Antenna Theory and Design, Wiley, 2013.
Course Description	This course covers the following topics: Fundamental and Parameters of antennas - Linear wire antennas: small dipole, Finite length Dipole, Half-Wavelength Dipole, Image method, Linear element near or on Infinite ground plane, Folded Dipole, Long wave antenna, Traveling wave antennas. - Loop Antennas: Small Circular loop, square loop. - Helical Antennas: - Arrays of Elements: Two element array, N-Element arrays, Broad side array, End fire arrays, Yagi-Uda type dipole array. - Reflector Antenna. - Aperture Antennas. Field equivalence principle: Huygens principle, Radiation Equation, Rectangular Aperture, Slot Antennas, Horn Antennas. - Micro-strip Antennas: Basic characteristic, Feeding methods, Methods of analysis, Rectangular Patch. - Radio Wave Propagation.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26448 – Optical fiber communications**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26342 Electromagnetic Fields – 2**
Textbook	J. Palais, Fiber Optic Communications, Prentice Hall, 2005.
Course Description	This course covers the following topics: This course cover the following topics: Introduction to optical communication - Advantages of optical fibers in communication and optics review - Light wave fundamentals, and Numerical aperture and acceptance angle - Planar optical waveguide, and Optical fiber waveguide - Step-index and graded-index optical fibers - Single and multimode optical fibers - Bandwidth of optical fibers - Optical fiber impairments: loss, dispersion and nonlinearity - Optical fiber cables and connections - Methods of manufacture of optical fibers - Optical sources: light emitting diodes and laser diode - Optical detectors: p-n and p-i-n photodiodes - Optical fiber amplifiers - Optical communication systems - Introduction to integrated optics.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26457 – Smart Grids and Distribution System**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (8) / Year (4)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	Fundamentals of Smart Grid Systems by Kamran, Muhammad. San Diego Elsevier Science & Technology 2022.
Course Description	This course is designed to provide key concepts of power systems, distributed renewable energy generation, energy storage and integration in smart grids. It introduces the concepts of load management, demand response and active network management. The course discusses the development towards the future distributed renewable energy generation, and Smart Grid. The starting point is the understanding of how design, operation and control of power systems traditionally have been considered. Smart grid versus conventional electrical networks is also covered, as well as the infrastructure of smart grid. Integration of distributed and intermittent renewable energy requires a new paradigm, and the course gives a basis to understand and contribute to this development. In addition, the course discusses the interaction between the power grid and flexible resources, and smart meters.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26546 – Digital Signal Processing**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26341 Signal Analysis and Systems**
Textbook	S. Mitra, Digital Signal Processing: A Computer-Based Approach, Mc-Graw Hill, 2011.
Course Description	This course covers the following topics: Discrete time signals and systems - z-transform and its application to LTI systems - Discrete-time Fourier transform, discrete Fourier transform, and - Fast Fourier transform - Structures for FIR and IIR systems - Introduction to design of digital filters - Applications of DSP in radar, speech, and image processing - DSP using MATLAB
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26554 – Electrical Power Systems – 2**
Credit and contact hours	**2 (1, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	S. Mitra, Digital Signal Processing: A Computer-Based Approach, Mc-Graw Hill, 2011.
Course Description	This course covers the following topics: Admittance and Impedance Model of power system – symmetrical three phase faults in power systems - Symmetrical components – Unsymmetrical faults: single line to ground, line-to-line and Double line-to-ground faults – Earthing impedance - Power Flow problem and Solutions - Gauss-Sidel, Newton-Raphson methods and Fast decoupled technique for load flow - Power System Stability: Rotor Dynamics and the Swing Equation - The Power-Angle Equation - Equal area criterion – Multi machine Stability Studies – Inertia constant and angular momentum - step-by-step method of solution, critical clearing angle and time.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26555 – Computer applications in Power Systems**
Credit and contact hours	**2 (1, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1** **EE 26324 Computer Programming**
Textbook	Hadi Saadat , "Power System Analysis", Third Edition.
Course Description	This course explores the integration of computer applications in the analysis, modeling, control, and operation of power systems. Students will gain practical skills in using software tools and programming languages relevant to power system applications.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26556 – Electrical Power Systems Protection**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	S. Rao, Switchgear Protection and Power Systems: Theory, Practice & Solved Problems, Khann Publishers, 2008.
Course Description	This course cover the following topics: General background, function and usage of switch-gear; fuses, switches, Cir breakers - Current, voltage transformers and substation layout - Typical relay and circuit breaker connection - Construction of over-current relay and their types - Grading of over-current relay on radial and ring systems - Differential relays; their significance and applications and the use of merz-price system - Distance relays; their significance, types, relay settings and relay over/under reach calculations - Differential and distance relay schemes - Carrier current scheme – Motor protection - Transformer/generator protection scheme.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26572 – Graduation Project – 2**
Credit and contact hours	**3(6proj)**
Required or Elective	**Required**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26471 Graduation Project – 1**
Textbook	It is indicated according to the specialization field which will be chosen for the project.
Course Description	This course is considered as part two or final of a comprehensive course that integrates the various elements of the study plan in the overall Electrical engineering design project experience. Students choose specific Electrical design projects from among a variety of subjects in the disciplines of Electrical and work on implementing them within a task proposal. The student is encouraged to do computer applications and work as a team in order to complete this part of the project and to implement this in accordance with the instructions of the Project/course supervisor(s)/professor and task proposal.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26527 – Industrial Control Systems**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26426 Automatic Control Systems**
Textbook	W. Stutzman and G. Thiele, Antenna Theory and Design, Wiley, 2013.
Course Description	This course covers the following topics: Introduction to industrial control, Detecting sensors and actuating elements, Relay logic and their applications, Introduction to programmable logic controllers (PLCs) and their types, Construction and hardware configuration and descriptions of PLCs, Programming and testing basic as well as advanced functions, Industrial applications using PLC. Introduction to Supervisory Control and Data Acquisition: Tags and tag logging system, Graphics designer, Alarm logging system, Trends, and tables. Industrial application examples.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26549 – Wireless Communications**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26445 Digital Communications**
Textbook	T. Rappaport, Wireless Communications: Principles and Practice, Prentice Hall, 2001.
Course Description	This course cover the following topics: Historical Overview-Wireless Communication Systems Development - The Cellular Concept-System Design Fundamentals - frequency reuse - hand-off- cell splitting, indoor/outdoor propagation - co-channel interference Grade of Service (GOS): Probability of Blocking and delay - Large Scale Propagation Model - Free-Space Propagation Model - Reflection form dielectrics -Reflection from perfect conductors - Diffraction, Scattering - Practical Link Budget Design Using Path Loss Models – Outdoor Propagation Models- Small Scale Fading and Multipath - Small Scale Multipath -Measurements, Parameters of Mobile Multipath Channels - MSK, GMSK and Spread Spectrum Techniques - Wireless cellular communication systems: GSM and AMPS.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26459 – Power System Control**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	Chakraborti A., Soni,M.L., Gupta,P.V. and Bhatnagar,U.S., a Text Book on Power System Engineering, Dhanpat Rai and Co. (P) Ltd. (2008).
Course Description	This course covers the following topics: Ideas of load frequency and voltage control, Reactive power control, Block diagrams of P-f and Q-V controllers, ALFC control, Static and dynamic performance characteristics of ALFC and AVR controllers, Excitation systems model, concept of area. Voltage Stability: Basic concepts, Voltage collapse, P-V and Q-V curves, Impact of load, Static and dynamic analysis of voltage stability, Prevention of voltage collapse. Tie-line operations and factors affecting security, Contingency analysis, Network sensitivity, correcting the generation dispatch by using sensitivity method and linear programming.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26564 – Electric Drive Systems**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26462 Electrical Machines – 2** **EE 26452 Power Electronics**
Textbook	Gonzalo Abad, "Power Electronics and Electric Drives for Traction Applications", John Wiley & Sons, 2017
Course Description	This course covers the following topics: Introduction to electric drive systems - Power switching devices and moment of inertia - Steady State Speed-Torque Characteristics of Electric Motors - Mechanical Transients: Equation of Motion. Applications - Starting of a Shunt Motor, Temperature Rise and Motor Power - Application to Hoist, Traction and Rolling Mill Drives - DC Motors, Braking, Rotating and Static Current Converter - Single Phase and Three Phase Controlled Converters and DC Choppers - Induction Motor Drives, Speed Control of the Induction Motor - Synchronous Motor Drives, Reluctance Motors - Synchronous Motor with Machine Commutated, Forced Commutation Current Converters.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26458 – High Voltage Engineering**
Credit and contact hours	**3 (2, 1, 1) (Lecture, Tutorial, Lab)**
Required or Elective	**Elective**
Level / Year	**Level (9) / Year (5)**
Course Prerequisite	**EE 26451 Electrical Power Systems – 1**
Textbook	Wolfgang Hauschild, Eberhard Lemke, "High-Voltage Test and Measuring Techniques", Springer International Publishing, 2019.
Course Description	This course cover the following topics: High voltage generation and transmission - Electrical breakdown theories in different insulators (gases, liquids, & solids) - High voltage testing (impulse generation & specifications of high voltage laboratories) - Different insulators for overhead transmission lines and substations - Single and 3-core cables. Electrical stresses cables. - Calculation of different grounding and earthing schemes.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**CE 26574 – Principles of scientific research in Engineering**
Credit and contact hours	**2 (2, 0, 0) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (10) / Year (5)**
Course Prerequisite	**-**
Textbook	Booth, W. C., Colomb, G. G., Williams, J. M., Bizup, J., & Fitzgerald, W. T. The craft of research. (Latest edition).
Course Description	This course aims to provide students with the tools and skills required to conduct research both theoretically and practically. It is intended to help students develop research questions, based on a critical appraisal of existing research. It purports to enable students to embark on new research projects through introducing them to the different principles and scientific methods of research writing.
Course is prerequisite for	-

Course Syllabus

Course Code and Name	**EE 26573 – Cooperative training**
Credit and contact hours	**149 CR2 - 8 (0, 0, 16) (Lecture, Tutorial, Lab)**
Required or Elective	**Required**
Level / Year	**Level (10) / Year (5)**
Course Prerequisite	**-**
Textbook	It is indicated according to the specialization field which will be chosen for the training.
Course Description	This course offers students an opportunity to gain hands-on experience in their chosen profession through cooperative training placements. Students will work under the supervision of industry professionals, applying theoretical knowledge in practical settings while developing essential workplace skills.
Course is prerequisite for	-